

Liquefied Gas Catholytes for Ultra-Low Temperature Lithium Primary Batteries, Phase I

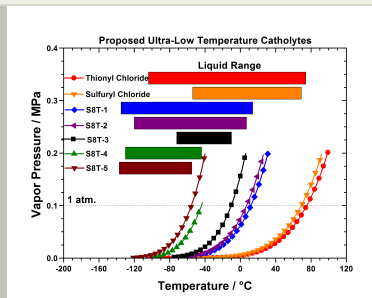
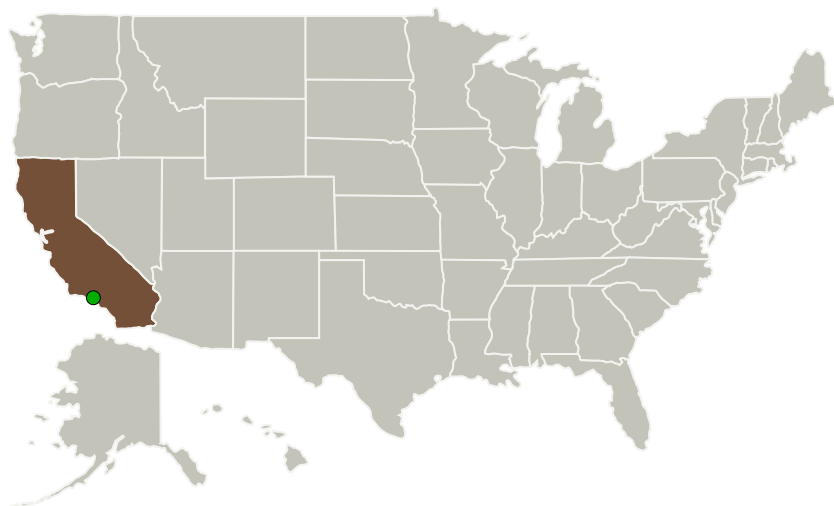
Completed Technology Project (2017 - 2017)



Project Introduction

NASA's Ocean Worlds exploration missions require batteries which operate as low as -100 C (defined here are "Ultra-Low Temperatures") and lower, a critically difficult challenge using current state-of-art materials. Conventional lithium primary batteries utilize a liquid catholyte with a low melting point which allows operation as low as -80 C. However, these conventional materials will be unable to push the low-temperature operation limit to meet NASA's requirements for Ocean Worlds missions. South 8 Technologies proposes the use of "Liquefied Gas Catholytes for Ultra-Low Temperature Lithium Primary Batteries". These catholytes are gaseous under standard conditions, but may be liquefied under mild pressures, showing exceptionally low melting points, very low viscosities and relatively high dielectric constants, allowing for ultra-low temperature operation of Lithium Primary Batteries. South 8 Technologies believes the technology proposed will enable energy storage at temperatures as low as -140 C, whereas the state-of-art allows operation is limited to -80 C. High temperature operation will be similar with operation limited to about +60 C. Further, the energy density of the active cathode material may be increased by as much as 30%, as will be shown. Voltage delay, a reoccurring issue in lithium primary batteries, may be reduced as well. These items will be discussed throughout the proposal.

Primary U.S. Work Locations and Key Partners



Liquefied Gas Catholytes for Ultra-Low Temperature Lithium Primary Batteries, Phase I Briefing Chart Image

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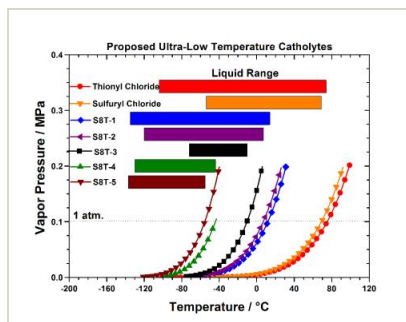


Organizations Performing Work	Role	Type	Location
South 8 Technologies, Inc.	Lead Organization	Industry	San Diego, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Images



Briefing Chart Image

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(<https://techport.nasa.gov/image/126259>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

South 8 Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

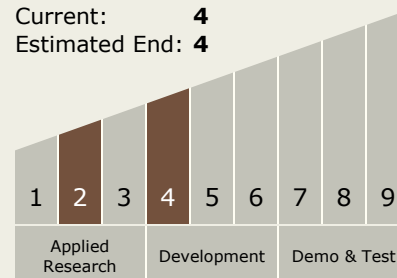
Carlos Torrez

Principal Investigator:

Cyrus Rustomji

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.2 Energy Storage
 - └ TX03.2.1 Electrochemical: Batteries

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System